1986 ANNUAL REPORT

The Coordinating Committee of Maritime Electric Utilities

presented to

The Council of Maritime Premiers

Maritime Electric Company,Limited

New Brunswick Power

Nova Scotia Power Corporation.

THE COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

1986 ANNUAL REPORT

TO

THE COUNCIL OF MARITIME PREMIERS

3460M

1987 06 01

Premier J.M. Buchanan
Premier R.B. Hatfield
Premier J.A. Ghiz

Sirs:

It is with pleasure that we, the members of the Co-ordinating Committee of Maritime Electric Utilities, submit our Annual Report.

The Co-ordinating Committee of Maritime Electric Utilities (CCMEU), having now completed its sixth full year of operation, feels that its existence has helped to promote and ensure full co-operation among the regions's electric power utilities.

We also believe that CCMEU serves a useful role in identifying, discussing and quantifying the benefits of such co-ordination for the Council of Maritime Premiers.

Respectfully,

D.G. Brown
Chairman, CCMEU
Nova Scotia Power Corporation

J.H. Reynolds
Secretary, CCMEU
Maritime Electric Company Limited

G.L. Titus
Member, CCMEU
New Brunswick Power

3460M

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1.0 SUMMARY OF FINDINGS

1.1 General

The committee feels that the terms of reference provided by the Council continue to be satisfactory and will result in the ability to provide valuable information to both the Council and the Utilities in matters relating to the efficient regional development and operation of the Maritime Electric Power Systems.

The individual Operating, Planning, and Research and Development Subcommittee reports provide an overall appreciation of Committee results.

Highlights from these subcommittee reports reveal the following:

1.2 Regional Operating Subcommittee Report

Customers in the Region continued to receive more reliable service and reduced costs as a result of interconnected operation of the three utilities. Slightly over one billion kilowatthours of energy worth 26.8 million dollars was exchanged during the year. The benefit to member utilities from the exchange was 13.6 million dollars. The pricing of these energy transactions is largely determined by electricity production costs which dropped as oil prices fell during the year. The reduction in the value of the transactions was, however, far outweighed by the direct benefit to customers of the lower oil fired generation costs.

The coordination of maintenance activities to provide economies of operation and improved reliability continued during the year.

Progress was made in the ongoing endeavour to improve overall utilization of existing electrical energy resources.

1.3 Regional Planning Subcommittee Report

The report summarizes the regional load forecast and load resources review for the Maritime Utilities.

The Regional Load Forecast is based on the forecast of the individual utilities. The past year has seen a strong growth in domestic sales at 10.8%, a moderate growth in commercial sales at 4.7% and a decrease in industrial sales at -5.0%. Total sales have grown 2.8% over the past year. Average annual growth rates over the years 1986/87 to 2000/2001 are expected to be 2.8% for energy and 2.8% for peak demand.

1.4 Regional Research and Development Subcommittee Report

The Subcommittee is pleased to report a continual development in the R&D communications structure in all member utilities, enabling the dissemination of R&D information in an effective manner, and providing coordination of each utility's internal R&D activities. Pooling of resources and results are made whenever such activity will benefit the utilities in the region.

The main areas of R & D in the region related to the following:

- reduction in acid-forming gas emissions
- load research information
- preventive maintenance
- alternative fuels for oil-fired plants
- research into new energy markets

A review of current R & D activity reveals the following projects in each utility:

1.4.1 New Brunswick Power

- Dalhousie Unit No. 1 - Orinoco Fuel Project
- Circulating fluidized bed demonstration project
- Distributed-mixing coal burner development
- OX-CE fuel demonstration at the Chatham generating station
- NRC demonstration at the Chatham generating station
- Coal wash project
- Development of an on-line performance monitoring system
- Retrofit variable-speed drive to an induced-draft fan
- Electrical testing of thermally-deteriorated converter transformer to determine remaining electrical strength
- Lightning ground flash density measurements in Canada
- Field trials of galloping-control devices for bundled conductors
- Power system harmonics - a review and assessment of problems
- Survey of Canadian electrical inspection authorities re service entrance upgrading practices
- High-temperature industrial heat pump laboratory
- Heat pump dehumidification drying in a fish smokehouse
- Scheduling of major thermal plant equipment inspections.

1.4.2 Nova Scotia Power Corporation

- Accelerated material evaluation of polymer insulators for transmission lines
- Application of ion chromatography to chemical analysis of the steam/water cycle
- Atmospheric fluidized bed studies
- Circulating fluidized bed feasibility study
- Coal-liquid mixtures conversion feasibility study
- Control of distribution line galloping
- Evaluation of CCA-PEG treated Scotch pine poles
- Field testing of distribution equipment and line materials in a marine atmosphere
- Field testing of insulators and associated equipment on 25kV distribution lines in a coastal salt environment
- Marginal cost-based peak load pricing and load control study
- Nova Scotia add-on plenum heater experiment
- Performance of preservative-treated white and red spruce poles

1.4.3 Maritime Electric Company Limited

- Wind test site, North Cape, P.E.I.
- Coal-liquid mixture combustion - Charlottetown, P.E.I.
- Farm losses resulting from electric service interruptions
- Transmission conductor galloping

2.0 THE COMMITTEE

The membership of the Committee shall consist of one representative, and an alternate, from each of the electric utilities. Observers delegated by each Provincial Government and the Federal Government may attend Committee meetings.

2.1 Committee Membership

Mr. D.G. Brown, Chairman
Vice President - Planning
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P.O. Box 910
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Mr. J. H. Reynolds, Secretary
President and C.E.O.
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Mr. G. L. Titus, Member
Vice President,
Planning & Development
New Brunswick Power
515 King Street
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2.2 Observers To The Committee

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Deputy Minister
Dept. of Energy & Forestry
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Charlottetown, P.E.I.
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Barry Toole
Secretary, Cabinet Committee on Policy and Priorities
Cabinet Secretariat
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E. Martin Warnes
Director Electrical Energy Technology
Energy, Mines and Resources Canada
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2.0 The Committee (cont'd)

2.3 Alternate Committee Members

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Senior Vice President
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P. H. Newcombe (Alt. Member)
General Manager
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Charlottetown, P.E.I.
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L.J. Sweett (Alt. Member)
Vice President - Customer Services
Nova Scotia Power Corporation
Post Office Box 910
Halifax, Nova Scotia
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2.4 Alternate Observer

Gerry D. Mendleson
Director, Legislative Affairs
Government of Nova Scotia
P.O. Box 1617
Halifax, Nova Scotia
B3J 2Y3

2.0 The Committee (cont'd)

2.4 Committee Terms of Reference

The responsibility, structure, and operation of the Committee is intended to ensure a continuing high degree of cooperative effort among the electric utilities of New Brunswick, Nova Scotia, and Prince Edward Island in the development and operation of an economic and efficient interconnected regional electric power system.

Responsibilities of the Committee shall include:

(1) Development of coordinated load growth forecasts on an annual basis.

(2) Identification and evaluation of regional electric utility development opportunities.

(3) Development of optimum coordinated short and long range utility expansion plans.

(4) Coordination of operations of the three utility systems with the objective of minimizing total regional generation costs, and improving security of supply.

(5) Coordination of electric energy research and development, conservation and related activities of a regional nature.

(6) Provision of a regional focus for operations coordination with neighbouring utility systems.

(7) Such matters as may be referred to the committee by the Council.

The Committee shall meet at least quarterly with locations normally rotating among the three provinces.

The Committee shall submit a written report at least annually to the Council of Maritime Premiers.

2.0 The Committee (cont'd)

2.5 Subcommittee Membership

2.5.1 Regional Operating Subcommittee

Chairman: W.V. Wallace
Nova Scotia Power Corporation

Members: P.H. Newcombe
Maritime Electric Company, Limited

W.A. Patterson
New Brunswick Power

2.5.2 Regional Planning Subcommittee

Chairman: J. L. Boomhower
Maritime Electric Company, Limited

Members: R. W. Brown
Nova Scotia Power Corporation

D. G. Hayward
New Brunswick Power

2.5.3 Regional Research and Development Subcommittee

Chairman: C. T. Flynn
New Brunswick Power

Members: J. Kiuru
Nova Scotia Power Corporation

J. A. Lea
Maritime Electric Company, Limited

1986

ANNUAL REPORT

OF THE

REGIONAL OPERATING SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

Members:

W.V. Wallace - Chairman, NSPC
P.H. Newcombe MECL
W.A. Patterson NBEPC

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3.1 EXECUTIVE SUMMARY

This is the sixth annual report of the Regional Operating Subcommittee to the Coordinating Committee of Maritime Electric Utilities and describes the subcommittee's activities during 1986.

Customers continued to receive more reliable service and reduced costs as a result of interconnected operation of the three utilities. Just over one billion kilowatthours of energy worth 26.8 million dollars was exchanged during the year. The benefit to member utilities from the exchange was 13.6 million dollars. The pricing of these energy transactions is largely determined by electricity production costs which dropped as oil prices fell during the year. The reduction in the value of the transactions was, however, far outweighed by the direct benefit to customers of the lower oil fired generation costs.

The coordination of maintenance activities to provide economies of operation and improved reliability continued during the year.

Progress was made in the ongoing endeavour to improve overall utilization of existing electrical energy resources.

3.2 RECOMMENDATIONS

It is recommended that the Regional Operating Subcommittee continue with the proposed activities for 1987 as described in Section 3.5.

3.3 TERMS OF REFERENCE

The Regional Operating Subcommittee shall consist of at least one member from each of the utilities in the Maritime region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of the Maritime Electric Utilities (CCMEU) at least twice yearly.

The Regional Operating Subcommittee shall undertake to do the following:

3.3.1 Monitor and report on activities within each utility with respect to changes in control and operating policy and practice.

3.3.2 Review, at least annually, the operating policies and practices in effect in the different utilities and determine if there are benefits of intergrating different operational aspects of the utilities.

3.3.3 Endeavour to determine the optimum dispatch of existing electrical energy resources on a regional basis including imports from outside the region and where beneficial, exports and report on any actions that the Subcommittee thinks could be beneficial to the utilities individually or collectively.

3.3.4 Attempt to identify and report on possible savings due to allocation of hydro on a regional basis and possible methods of sharing benefits from such allocation.

3.3.5 Submit minutes of Subcommittee meetings to the Secretary of CCMEU for distribution to CCMEU members and other Subcommittee members.

3.3.6 Submit a proposed work program and an expected budget requirement to the CCMEU by June 1 of each year.

3.4 ACHIEVEMENTS FOR 1986

3.4.1 Benefits from Interconnected Operation

Better service is provided to customers and at a lower cost through the interconnected operation of the three member utilities.

By agreement a member can call upon the generation reserves of another utility in the region for assistance in coping with a sudden emergency such as the tripping of a large generator or with a longer term problem such as a disruption in fuel supply or a major problem with a generating unit resulting in a lengthy outage. Through sharing reserves the total amount of generation that is required on-line in the region at any given time is reduced and therefore the cost of providing reserve as well.

The largest saving to customers accrues from the interchange of energy between members on an hourly, weekly and monthly basis. These transactions are arranged whenever one utility has surplus energy which can be produced at a cost lower than the production cost of a neighbouring utility. The benefit of the transaction is shared between the seller and the purchaser.

The volume of energy transactions between the members totalled just over one billion kilowatthours in 1986. The transactions had a total value of 26.8 million dollars and provided a benefit of 13.6 million dollars to the members.

Oil prices fell dramatically early in the year and remained well below the levels of recent years throughout the remainder of 1986. This resulted in a significant reduction in production costs at oil fired generating stations in the region. Since the pricing of interchange transactions is related to production costs, the total value of these transactions in 1986 was lower than in previous years. Although the saving associated with these transactions was below the level of recent years, the direct benefit to customers of the lower oil fired generation costs far outweighed this reduction.

A reduced margin between the price of coal fired and oil fired generation and a reduction in the resale of coal fired energy from Nova Scotia resulted in a reduction in the volume of transactions in 1986.

INTERCONNECTION TRANSACTIONS *

for period January 1, 1986 to December 31, 1986

Energy Transactions Between	Volume of Interchange (MWh)	Total Value of Transactions ($)	Benefits of Transactions ($)
N.B. Power to N.S. Power Corp.	545,300	11,600,000	5,200,000
N.S. Power Corp. to N.B. Power	5,200	300,000	80,000
N.B. Power to Maritime Electric Co.	456,600	14,900,000	8,270,000
	1,007,100	26,800,000	13,550,000

*Benefits of Dalhousie participation agreement not included.

3.4.2 Generation Maintenance Scheduling

Generation maintenance scheduling plans were exchanged by the members and reviewed to allow production costs to be reduced and to ensure that adequate generation reserves are maintained.

3.4.3 Transmission System Maintenance

Personnel from the three member utilities meet annually to review common items of concern, provide coordination and future cooperation in relation to transmission maintenance. Specific items addressed included insulation replacement, transmission line inspection practices, circuit breaker maintenance, battery testing, radio noise interference measurements and transmission line spares. Information on spare parts and specialized equipment was updated.

During the year suggested governing principles covering emergency assistance arrangements were exchanged as well as formal Mutual Assistance Rosters. These Rosters identify contacts as well as personnel and equipment which could be made available by one member utility to another to provide emergency assistance in restoring service.

3.4.4 Dispatch Facilities

In relation to system operations the major effort in all three member utilities during the past year was directed towards the replacement of energy control facilities to accomodate system growth, replace obsolete equipment and provide more efficient operation of generation, transmission and distribution systems.

Maritime Electric Co. Ltd. will complete installation of a new computer based SCADA (Supervisory Control and Data Acquisition) system at the Charlottetown Control Centre during the summer of 1987. Backbone communications will be provided by a fibre optic cable embedded in an overhead ground wire of a 138 kV transmission line between Charlottetown and Bedeque. Existing UHF radio equipment will be reconfigured to provide communications to outlying areas.

NSPC is constructing a new Energy Control Centre at Ragged Lake Research and Business Park in Halifax. Province-wide control of generation and transmission will be provided from new SCADA equipment and energy management systems due for installation in 1987. The dual function centre will provide control of distribution networks in the Halifax area in 1988.

Personnel responsible for the Development of the Control Centres met several times during the year to exchange information in areas of mutual benefit.

3.4.5 Optimum Dispatch of Electrical Energy Resources

During 1985 a Thermal Generation Working Group established by the Regional Operating Subcommittee developed standardized methods for determining electrical production costs for use in the interchange of energy. Difficulties were encountered in applying the methods to the individual utility systems due to differences in cost accounting e.g., one utility might have an historical record of particular costs on an individual generating unit basis while another utility recorded these costs

on a total station basis. Efforts of the Working Group during the past year focused on accomodating these differences and standardizing where possible. It is expected that during the coming year documentation will be completed and the methods approved and implemented by the Operating Committees which exist under the terms of the Interconnection Agreements between individual utilities.

Methods of sharing tie line regulation between NSPC and NB Power were identified during the year. These were restricted to the exchange of regulation with one utility providing control for the overall area due to limitations in existing control facilities. Further action was deferred pending completion of new control facilities as noted in 3.4.4.

3.4.6 Interconnection Facilities

No changes were made to the facilities which directly interconnect the three utilities, however a new 138 kV transmission line from the interconnection terminal at Bedeque Substation to West Royalty, near Charlottetown, will be commissioned in early 1987.

3.5 PROPOSED ACTIVITIES FOR 1987

3.5.1 Continue to evaluate and report on the annual benefits from interconnected operation.

3.5.2 Continue to exchange maintenance schedules of generation and major transmission facilities to enhance operating efficiency.

3.5.3 Update information exchanged on spare parts and apparatus for transmission facilities and specialized test equipment.

3.5.4 Complete the objectives of the Working Group on production costs.

3.5.5 Continue work on sharing of tie line regulation.

3.5.6 Continue efforts associated with the joint dispatch of hydro.

ANNUAL REPORT

OF THE

PLANNING SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

JANUARY 1987

Members:

J.L. Boomhower - Chairman, MECL

R.W. Brown NSPC

D.G. Hayward NB Power

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4.1 SUMMARY

This is the sixth annual report of the Planning Subcommittee to the Coordinating Committee of the Maritime Electric Utilities. The report summarizes the Regional Load Forecast and the Load Resource Review.

The Regional Load Forecast is based on the forecast of the individual utilities. The past year has seen a strong growth in domestic sales at 10.8%, a moderate growth in commercial sales at 4.7% and a decrease in industrial sales at -5.0%. Total sales have grown 2.8% over the past year. Average annual growth rates over the years 1986/87 to 2000/2001 are expected to be 2.8% for energy and 2.8% for peak demand.

The Load Resources Review indicates that, from a generation reliability viewpoint, there is an adequate level of generation reserves in the Maritime Provinces until the mid 1990's. The results are given in Table 9 and Figure 1.

4.2 RECOMMENDATIONS

It is recommended that the Planning Subcommittee continue with the proposed activities for 1987 as outlined in section 4.6 of this report.

4.3 TERMS OF REFERENCE

The Regional Planning Subcommittee shall consist of at least one member from each of the utilities in the Maritime Region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of Maritime Electric Utilities (CCMEU) at least twice yearly.

The Regional Planning Subcommittee shall, through whatever mechanism it deems necessary, Task Force appointment, consultant acquisition, etc., (subject to approval of CCMEU) undertake to do the following:

1. Prepare a load forecast showing the power and energy requirements of the region for approximately two decades. This load forecast shall be reviewed and updated, if necessary, annually.
2. Obtain the plans of the individual utilities and combine them to prepare a regional load-resource balance.
3. Identify possible benefits through short term deferral and/or advancement of provincially scheduled units and will so notify the CCMEU.
4. (a) Considering all feasible regional alternatives, prepare an optimum long term generation expansion plan (including major transmission when necessary) without regard to individual utility boundaries and without regard to proposed provincial units which have not been committed to construction. The development of any optimum expansion plan will always start with the then existing and committed facilities of the three Systems.

4.3 TERMS OF REFERENCE (Cont'd)

(b) Prepare a report comparing the optimum regional expansion plan with the sum of the individual expansion plans and report its findings to the CCMEU.

5. Periodically assess the potential for imports from outside the region or exports outside the region, the constraints imposed by existing transmission system limitations and will recommend the need or otherwise for studies of incrementing transmission capacity.

6. Submit a proposed work program and an expected budget requirement to the CCMEU by June 1 of each year.

4.4 WORK PROGRAM FOR 1986

The following is the 1986 work program as proposed in last year's Annual Report:

1. Continue the development of an appropriate long term economic regional generation expansion plan taking into consideration potential generation alternatives and major transmission requirements.

2. Produce a regional load forecast.

3. Produce the load resource balance for generation existing and under construction.

4. Address additional requests of the Coordinating Committee as required.

5. Write a formal report(s) on the subcommittee annual activities.

4.5 ACHIEVEMENTS FOR 1986

4.5.1 Regional Load Forecast

The individual Maritime utilities forecasts have been combined in Table 1 to give the Regional Load Forecast. Average annual compound growth rates for the period 1986/87 to 2000/2001 are 2.8% for energy and 2.8% for peak demand. The long term growth is slightly lower than last year with 2000/2001 presently forecast at 5260 MW/28257 GWh as compared to 5313 MW/28859 GWh.

Since the individual utility annual peak loads do not necessarily all occur at the same hour of the year, their arithmetic sum is usually greater than the annual peak load demand of the integrated regional system. A projection of future hourly loads of each of the three utilities has been combined to obtain the total peak load forecast for the region. The results are shown in Table 2.

Table 3 summarizes the expected long term growth in energy sales by sector. Growth in the domestic sector has been fairly strong over the past three years. The commercial sector has seen moderate growth. The industrial sector growth rate has been quite volatile. Total sales increased 2.8% in 1985/86 and averaged 4.1% per year between 1981/82 and 1985/86. Between 1985/86 and 2000/2001 the forecast annual compound growth rate in total sales is 3.1%.

4.5 ACHIEVEMENTS FOR 1986

4.5.1 Regional Load Forecast (Cont'd)

Tables 4 and 5 show respectively the regional monthly coincident peak demand and energy forecasts. The month of maximum peak demand and the month of maximum energy demand continues to be January.

With all the uncertainties in the future variables which could effect the growth in electricity consumption, the forecast must be frequently updated, and can only act as a guide to utility planning.

4.5.2 Regional Load and Resources Review

The Load and Resource Review is intended to examine the ability of the regional utilities generating facilities to reliably meet the anticipated future demands of the customers.

4.5.2.1 Load Requirements

To allow for maintenance and account for forced or unexpected outages of generating units, the total generating capacity installed in the region must be greater than the regional load. This excess of generation over expected load is known as reserve. The load requirement to be met in the region consists of the forecast firm load plus a specified amount of reserve.

4.5 ACHIEVEMENTS FOR 1986

4.5.2.2 Resources

The generation resources are comprised of the total generation capabilities from both existing generating stations and those under construction. Listings of the resources are given by Province in Tables 6, 7 and 8. The resources consist of a mix of hydro, coal fired thermal, oil fired thermal, gas turbine and nuclear generation.

4.5.2.3 Reserve Criterion

For the purpose of this regional examination, the following criterion has been applied to the combined NB, NS and PEI systems.

The reserve criterion requires that the total generating capacity available in each month be able to supply the load during the peak hour of the month with a surplus equal to 20% of the forecast firm load or the capacity of the largest unit, whichever is larger. To meet this criterion thermal and hydro generating units are considered as having been fully maintained prior to the peak demand period and, therefore, available at their full rated capabilities.

Although this criterion is a reasonable guide for regional reliability of supply, the final decision on the

4.5.2.3 Reserve Criterion (Cont'd)

exact timing of new capacity may also take into consideration the energy production capability of existing hydro and the potential for support from ties to external systems.

4.5.2.4 Regional Electrical Capability Assessment

A comparison is made between the generation resources and the load required for each month of the study period. A surplus or deficit in the capability to supply is determined.

This assessment requires that generation reserve is added to the peak forecast load to determine the total peak load that would have to be met. This total load is compared with the sum of the generation supplies available from hydro, nuclear and fossil units to determine the surplus or deficit. In doing this calculation all generating units are considered to be available at their full net rated capability as given in Tables 6, 7 and 8. The results of this assessment are presented in Table 9 and Figure 1.

The available storage water for hydro generation is regulated in a manner to maximize the benefits on the system.

4.5 ACHIEVEMENTS FOR 1986

4.5.2.4 Regional Electrical Capability Assessment (Cont'd)

The combined load resource balance of the NB, NS and PEI systems has been carried out for each month of the year. This report provides only details of the peak load month in each year, since this condition has been used to define the system surpluses and deficiencies and hence indicates from a reliability viewpoint when new generation is required.

For the purposes of determination of the reserve requirements, the largest unit in the region is as follows:

1. Until 1991/92 - Point Lepreau at 405 MW
2. After 1991/92 - Point Lepreau at 635 MW

4.5.3 Regional Generation Alternatives

Previous analysis and reports have demonstrated that the combination of the individual utility plans have provided a near optimum solution to required generation expansion. No new analysis has been undertaken this year to define additional expansion plans.

The following, however, does indicate the potential generating resources available to the Maritime utilities.

4.5 ACHIEVEMENTS FOR 1986

4.5.3.1 Conventional Hydro

A potential development exists at Green River in New Brunswick for a pumped storage project with an annual energy capability of 130 GWh from two 80 MW units. The development, as proposed, would operate as a seasonal storage. Water stored during the spring would be released during the low flow, high system electrical demand periods. The development would also operate year round as a daily cycle pump storage facility whereby the units would generate power during the peak load hours of the day. The water released during this generation would be pumped back from the lower reservoir during the night.

A potential for redevelopment exists at Grand Falls in New Brunswick where up to 300 MW additional capacity could be developed to produce 655 GWh annually.

Other potential developments in New Brunswick exist at the Morrill site with an installed capacity of approximately 140 MW and the existing Tobique Plant where pumped storage operation could be utilized. Other possible new hydro generation and storage sites exist throughout New Brunswick.

In Nova Scotia there are no major hydro projects left to be developed.

4.5.3.1 Conventional Hydro (Cont'd)

There are no potential hydro sites in PEI.

4.5.3.2 Tidal

There are two tidal projects which continue to exhibit some potential of becoming economically viable. Site B9 across the mouth of Cobequid Bay has a potential capacity of 5000 MW and A8 across the Cumberland Basin has a potential capacity of 1400 MW. Both sites are large with respect to the region, are economically dependent on substantial export and have a minimum 10 year engineering and construction lead time.

4.5.3.3 Nuclear

Nuclear power remains a potentially economically acceptable base load option.

4.5.3.4 Natural Gas

This is not currently available to the region and should it become available it would likely only be to provide a short term market for gas by burning it in units such as Coleson Cove, Courtenay Bay or Tufts Cove.

4.5.3.5 Coal

Coal power is potentially economic and financially attractive in both new units and in the conversion of existing oil-fired units. Nova Scotia is presently

4.5.3.5 Coal (Cont'd)

converting a 150 MW oil-fired unit at Point Tupper to coal and New Brunswick is studying the conversion of Coleson Cove from oil to coal-firing. Both Nova Scotia and New Brunswick are examining the potential for new coal-fired units. Several projects have been undertaken to investigate the feasibility of burning coal more economically and cleanly through the use of technologies such as coal washing, coal-water mixtures and fluidized bed combustion. The large reserves of indigenous coal resources makes these options particularly important to investigate.

4.5.3.6 Load Management

In this document load management refers to efforts to manage customer load by action initiated by the utilities to move consumption from peak to off-peak periods. The large amount of peak shaving capability provided by the regions' hydro resources tends to minimize the advantage of load management. However, it continues to be investigated.

4.5.3.7 Conservation

The need for energy conservation continues to be a major concern of the Maritime Utilities and all practical forms of conservation are considered such as incentive programs and educational programs.

4.5 ACHIEVEMENTS FOR 1986

4.5.3.8 Other

Alternate energy sources such as wood, biomoss, solar, wind, fuel cells, etc. have been investigated as generation sources but, to date, have not been shown to be economically attractive.

4.6 PROPOSED ACTIVITIES FOR 1987

The activities proposed for 1987 are a continuation of the present work:

1. Produce a regional load forecast.

2. Produce the load resource balance for generation existing and under construction.

3. List potential future generation options available to the Maritime utilities.

4. Address additional requests of the Coordinating Committee as required.

5. Write a formal report on the subcommittee annual activites.

TABLE 1

MARITIME ELECTRIC UTILITIES

REGIONAL LOAD FORECAST

Fiscal Year	System Net Gwh*	Peak Hourly MW
86-87	19200	3564
87-88	19874	3685
88-89	20417	3794
89-90	21306	3961
90-91	22018	4086
91-92	22675	4213
92-93	23383	4347
93-94	24039	4470
94-95	24663	4588
95-96	25258	4699
96-97	25782	4796
97-98	26403	4910
98-99	27024	5026
99-00	27660	5142
00-01	28292	5260

Total Period Averge Annual Growth Rate:

Gwh = 2.8%

MW = 2.8%

* Includes System Losses

TABLE 2

MARITIME ELECTRIC UTILITIES

COINCIDENT PEAK LOAD FORECAST (MW)[1)]

FISCAL YEAR	N.B.	N.S.	P.E.I.	TOTAL	REGIONAL DIVERSITY	COINCIDENT REGIONAL LOAD
86-87	2071	1417	118	3606	42	3564
87-88	2141	1450	122	3713	28	3685
88-89	2205	1491	126	3822	28	3794
89-90	2283	1578	130	3991	30	3961
90-91	2363	1621	133	4117	31	4086
91-92	2438	1669	137	4244	31	4213
92-93	2511	1727	141	4379	32	4347
93-94	2580	1778	145	4503	33	4470
94-95	2648	1825	149	4622	34	4588
95-96	2714	1867	153	4734	35	4699
96-97	2776	1899	157	4832	36	4796
97-98	2839	1947	161	4947	37	4910
98-99	2902	1996	165	5063	37	5026
99-00	2963	2048	169	5180	38	5142
00-01	3025	2101	173	5299	39	5260
Average Annual Compound Growth Rate %	2.7	2.9	2.8			2.8

1) Net System Firm Peak plus Interruptible Load

TABLE 3

MARITIME ELECTRIC UTILITIES

LOAD FORECAST SUMMARY

(GWH)

FISCAL YEAR	DOMESTIC	COMMERCIAL	INDUSTRIAL	TOTAL
81-82	4226	3977	5679	13882
82-83	4416	4042	4988	13446
%	4.5	1.6	-12.2	-3.1
83-84	4791	4195	5871	14857
%	8.5	3.8	17.7	10.5
84-85	5159	4376	6323	15858
%	7.7	4.3	7.7	6.7
85-86	5715	4582	6008	16305
%	10.8	4.7	-5.0	2.8
00-01	8741	7137	9838	25716
%	2.9	3.0	3.3	3.1

% are per annum

TABLE 4

MARITIME ELECTRIC UTILITIES

MONTHLY COINCIDENT PEAK DEMAND FORECAST (MW)

FISC. YEAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1986/1987	2816	2753	2437	2330	2365	2535	2767	3076	3471	3564	3469	3252
1987/1988	3002	2842	2850	2442	2461	2554	2823	3165	3583	3685	3570	3350
1988/1989	3080	2905	2629	2487	2505	2606	2892	3242	3697	3794	3689	3464
1989/1990	3192	3003	2714	2603	2622	2729	3035	3397	3870	3961	3855	3626
1990/1991	3337	3130	2825	2669	2688	2803	3130	3505	4000	4086	3979	3746
1991/1992	3437	3214	2899	2737	2755	2878	3222	3606	4129	4213	4115	3877
1992/1993	3551	3314	2987	2818	2837	2965	3328	3722	4268	4347	4242	4001
1993/1994	3657	3406	3067	2844	2912	3045	3426	3828	4396	4470	4358	4115
1994/1995	3755	3491	3142	2963	2982	3122	3517	3928	4519	4588	4478	4231
1995/1996	3855	3580	3219	3036	3056	3200	3610	4030	4634	4699	4570	4321
1996/1997	3933	3645	3278	3090	3110	3259	3680	4107	4735	4796	4682	4430
1997/1998	4030	3731	3354	3164	3182	3335	3771	4207	4854	4910	4795	4540
1998/1999	4127	3818	3432	3235	3254	3412	3861	4304	4972	5026	4908	4649
1999/2000	4224	3903	3508	3309	3327	3491	3952	4405	5091	5142	5029	4766
2000/2001	4328	3997	3593	3389	3407	3575	4050	4512	5213	5260	5129	4864

TABLE 5

MARITIME ELECTRIC UTILITIES

MONTHLY ENERGY FORECAST (GWH)

FISC. YEAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1986/1987	1562	1466	1323	1318	1348	1355	1532	1657	1919	2033	1843	1844
1987/1988	1635	1530	1380	1358	1388	1397	1585	1716	1993	2093	1899	1900
1988/1989	1681	1567	1410	1386	1416	1428	1626	1760	2051	2162	1963	1967
1989/1990	1742	1620	1455	1451	1482	1495	1704	1844	2147	2256	2051	2059
1990/1991	1820	1689	1516	1487	1519	1535	1757	1902	2223	2327	2116	2127
1991/1992	1876	1735	1556	1526	1558	1576	1808	1956	2291	2404	2188	2201
1992/1993	1939	1789	1604	1571	1604	1624	1867	2018	2367	2475	2254	2271
1993/1994	1996	1839	1647	1615	1646	1668	1921	2077	2439	2541	2316	2334
1994/1995	2049	1885	1687	1654	1686	1709	1970	2130	2505	2609	2379	2400
1995/1996	2104	1934	1729	1694	1728	1753	2021	2185	2570	2661	2428	2451
1996/1997	2147	1969	1762	1725	1758	1785	2061	2227	2624	2724	2487	2513
1997/1998	2200	2017	1804	1766	1798	1827	2112	2281	2688	2788	2547	2575
1998/1999	2254	2063	1845	1806	1840	1870	2160	2335	2754	2853	2607	2637
1999/2000	2307	2111	1888	1847	1882	1912	2212	2388	2818	2921	2671	2703
2000/2001	2364	2161	1933	1892	1926	1958	2266	2446	2886	2978	2724	2758

TABLE 6

GENERATING STATION CAPABILITIES - NET MEGAWATTS[1] (MW)
EXISTING AND UNDER CONSTRUCTION
IN NEW BRUNSWICK

Hydro			Thermal			
Mactaquac	1	110	Grand Lake			
	2	110		5	5	
	3	110		6	5	
	4	116		7	15	
	5	113		8	57	
	6	113				
Beechwood	1	36	Chatham	1	9	
	2	36		2	20	
	3	41				
			Courtenay Bay	1	45	
Tobique	1	10		2	12	
	2	10		3	99	
				4	99	
Grand Falls	1	15				
	2	15	Dalhousie	1	102	
	3	15		2	183	2
	4	15				
			Coleson Cove	1	335	
Milltown		4		2	310	
				3	335	
Sisson		9				
			Lepreau Nuclear	1	635	3
Musquash		5				
			Moncton	1	22	
			Grand Manan		3	
Total Hydro		883 MW	Total Thermal		2291 MW	

1 Net megawatt values are derived by subtracting station service requirements from Gross Megawatt Capability.

2 Dalhousie unit 2 capability is reduced by 20 MW to recognize the joint ownership arrangement with Maritime Electric of Prince Edward Island.

3 Lepreau Nuclear available at 405 MW until Nov. 1, 1991 because of participation sales.

TABLE 7

GENERATING STATION CAPABILITIES - NET MW
EXISTING AND UNDER CONSTRUCTION
IN NOVA SCOTIA

HYDRO	MW	THERMAL	MW
Annapolis Tidal	17[1]	Glace Bay	75
Avon	7	Lingan 1	152
Bear River	36	Lingan 2	154
Black River	20	Lingan 3	151
Dickie Brook	2	Lingan 4	151
Harmony	1	Point Tupper 2	152[2]
Lequille	22	Trenton L.P.	40
Mersey	44	Trenton 5	144
Roseway	1	Tufts Cove 1	83
St. Margarets	10	Tufts Cove 2	98
Sheet Harbour	10	Tufts Cove 3	153
Tusket	3	Maccan	13
Wreck Cove	223	Combustion Turbines	205
TOTAL HYDRO	379	TOTAL THERMAL	1571

1 The 17 MW Annapolis Tidal unit is not included as firm capacity because of the cyclic nature of the tide.

2 Point Tupper #2 is being converted to coal and will be available in 1987 12 01.

TABLE 8

GENERATING STATION CAPABILITIES - NET MW
IN PRINCE EDWARD ISLAND

THERMAL	MW
Charlottetown	19.0
	19.0
	9.5
	7.2
	7.2
	3.8
	1.4
Borden	22.0
	12.8
Summerside	10.1
Dalhousie 2 (NBEPC Purchase)	20.0
TOTAL	132.0

TABLE 9

MARITIME ELECTRIC UTILITIES

LOAD & RESOURCE REVIEW

(PEAK LOAD MONTH)

Fiscal Year Apr/Mar	Forecast[1] Load MW	Req'd Res. MW	Total Req. MW	Thermal Cap MW	Hydro Cap MW	Gross Nuclear Cap MW	Nuclear Part. MW	Net Nuclear Cap MW	Total Resource MW	Surplus/ Deficit MW
1986/1987	3466.	685.	4151.	3208.	1263.	635.	230.	405.	4876.	725.
1987/1988	3585.	709.	4294.	3360.	1263.	635.	230.	405.	5028.	734.
1988/1989	3692.	730.	4422.	3360.	1263.	635.	230.	405.	5028.	606.
1989/1990	3857.	763.	4620.	3360.	1263.	635.	230.	405.	5028.	408.
1990/1991	3979.	787.	4766.	3360.	1263.	635.	230.	405.	5058.	262.
1991/1992	4104.	812.	4916.	3360.	1263.	635.	0.	635.	5258.	342.
1992/1993	4235.	839.	5074.	3360.	1263.	635.	0.	635.	5258.	184.
1993/1994	4356.	863.	5219	3360.	1263.	635.	0.	635.	5258.	39.
1994/1995	4471.	886.	5357.	3360.	1263.	635.	0.	635.	5258.	-99.
1995/1996	4581.	908.	5489.	3360.	1263.	635.	0.	635.	5258.	-231.
1996/1997	4674.	926.	5600.	3360.	1263.	635.	0.	635.	5258.	-342.
1997/1998	4786.	949.	5735.	3360.	1263.	635.	0.	635.	5258.	-477.
1998/1999	4899.	971.	5870.	3360.	1263.	635.	0.	635.	5258.	-612.
1999/2000	5012.	994.	6006.	3360.	1263.	635.	0.	635.	5258.	-748.
2000/2001	5127.	1017.	6144.	3360.	1263.	635.	0.	635.	5258.	-886.

1) Net System Firm Peak Load

MARITIME ELECTRIC UTILITIES
LOAD AND RESOURCE FOR PEAK LOAD MONTH

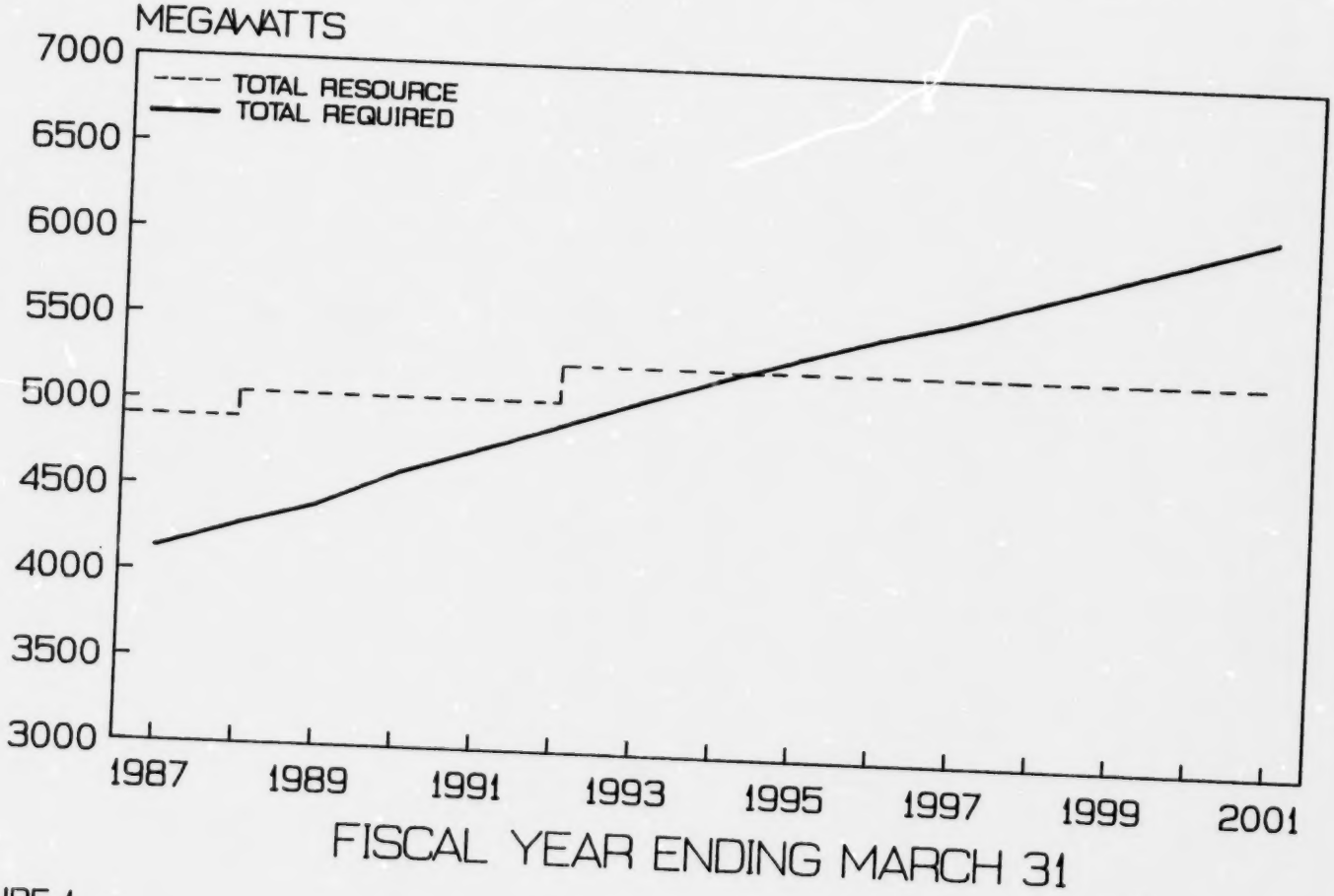

FIGURE 1

1986 ANNUAL REPORT

OF THE

RESEARCH AND DEVELOPMENT SUBCOMMITTEE

OF THE

COORDINATING COMMITTEE OF MARITIME ELECTRIC UTILITIES

JANUARY 1987

Members:

C.T. Flynn, Chairman, NB Power

J.A. Lea, MECL

J. Kiuru, NSPC

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5.1 EXECUTIVE SUMMARY

This sixth annual report of the Research and Development Subcommittee of the Coordinating Committee of Maritime Electric Utilities (CCMEU) covers the Subcommittee's activities during 1986.

The Subcommittee is pleased to report a continual development in the R&D communications structure in all member utilities, enabling the dissemination of R&D information in an effective manner and providing coordination of each utility's internal R&D activities.

During 1986, the Subcommittee continued to carry out its mandate as set forth in its Terms of Reference (Section 5.3). A summary of the Subcommittee's achievements for 1986 is shown in Section 5.5 of this report.

The reports on the status of recently-completed and on-going R&D projects in the Maritime Electric Utilities are summarized in Section 5.7. Pooling of resources and results are made whenever such activity will benefit the utilities in the region.

The main areas of R&D in the region in 1986 related to the following:

(a) reduction in acid-forming gas emissions
(b) load research information
(c) preventive maintenance
(d) alternate fuels for oil-fired plants
(e) research into new energy markets

5.2 INTRODUCTION

This is the sixth annual report of the Research and Development Subcommittee of the CCMEU which was formed in March 1982.

The summary of 1986 activities and the proposed activities for 1987 demonstrate a continuing increase and improvement in cooperative activity in which the benefits of R&D in the Maritime Electric Utilities are being shared among member utilities.

The contents of this report reflect the continued commitment by CCMEU and its member utilities to promote a regional approach to R&D within the Maritime Provinces.

5.3 TERMS OF REFERENCE

The Regional R&D Subcommittee shall consist of at least one member from each of the province-wide utilities in the maritime region. The Subcommittee will meet at least twice yearly and will report to the Coordinating Committee of the Maritime Electric Utilities (CCMEU) at least twice yearly.

The regional R&D Subcommittee shall undertake the following:

5.3.1 Report on all electric utility-related R&D activities that are currently underway in the Maritime provinces.

5.3.2 Set up procedures whereby it is informed of any individual utility initiatives in R&D activity and attempt to achieve regional interest and participation in these activities.

5.3.3 Promote and implement the free exchange of R&D project information, procedures and results in order to share the results of all R&D projects undertaken by each utility. Recommend joint projects when such cooperation would benefit the region.

5.3.4 Review current and planned R&D expenditures by the member utilities and to recommend how maximum regional benefit can be obtained from these expenditures; this would include, but not be limited to the recommending against duplication of R&D effort.

5.3.5 Review the current and proposed R&D participation by member utilies in the CEA R&D program, and recommend actions which will enhance the regional benefit of these projects. This includes the possibility of joint proposals and joint bids on R&D contracts by member utilities.

5.3.6 Review R&D activity undertaken by utilities in Canada that is outside the umbrella of the Canadian Electrical Association and obtain the results of that activity for regional use.

5.3.7 Recommend to the CCMEU those R&D initiatives that the Subcommittee thinks should be taken within the region.

5.3.8 For projects which are identified by all member utilities to be of regional interest, but which cannot be funded by CEA or other R&D Funding, the Subcommittee shall request funding by the member utilities through the CCMEU.

5.3.9 Submit minutes of Subcommittee meetings to the Secretary of CCMEU for distribution to members of the CCMEU and its other Subcommittees.

5.3.10 Submit a proposed work program and an expected budget requirement annually to the CCMEU as directed.

5.4 WORK PLAN FOR 1986

5.4.1 To continue to investigate areas where joint participation in R&D projects is possible.

5.4.2 To continue to share results of individual R&D projects.

5.4.3 To continue to follow developments in coal beneficiation studies through the activities of the Committee on Atlantic Coal. The Subcommittee will continue to follow the work of this group in order to ensure that maximum regional benefits and involvement, particularly in the area of economics, are realized from the ongoing work.

5.4.4 To continue to interface with the Circulating Fluidized Bed Management Board in order to identify and promote relevant research which will involve and benefit the region.

5.4.5 To continue to update its survey of R&D activities being carried out by member utilities in accordance with its Terms of Reference.

5.5 SUMMARY OF ACHIEVEMENTS - 1986

5.5.1 Regional Representation on CFB Management Board

Through the initiative of the R&D Subcommittee of the CCMEU, the circulating fluidized bed (CFB) Management Board continues to have regional representation. Board membership currently consists of N.B. Power, the Government of New Brunswick, Energy, Mines & Resources Canada and N.S. Power. The CFB Management Board provides overall guidance to the work and planning of the Chatham, N.B. CFB project, the N.S. Power 150 MW CFB feasibility study and the distributed-mixing burner at Chatham, N.B.

5.5.2 Coal Beneficiation

The Subcommittee has continued to follow and promote developments in coal beneficiation studies being carried out by the Committee on Atlantic Coal in order to ensure maximum regional benefits and involvement.

5.5.3 R&D Project Review

The Subcommittee has continued to develop a summary of the nature and funding levels of all utility-related R&D Projects undertaken or initiated within the region.

5.5.4 Update of Regional R&D Activity Report

The Subcommittee continued to update its survey of R&D activities within the region in accordance with its terms of reference. The latest results are contained in Section 5.7 of this report.

5.6 PROPOSED ACTIVITIES FOR 1987

5.6.1 To continue to investigate areas where joint participation in R&D projects is possible.

5.6.2 To complete a review of the funding level of utility-related R&D projects undertaken or initiated within the region.

5.6.3 To continue to share results of individual R&D projects.

5.6.4 To continue to follow developments in coal beneficiation studies through the activities of the Committee on Atlantic Coal. The Subcommittee will continue to follow the work of this group in order to ensure that maximum regional benefits and involvement, particularly in the area of economics, are realized from the ongoing work.

5.6.5 To continue to interface with the Circulating Fluidized Bed technology developments in order to identify and promote relevant research which will involve and benefit the region.

5.6.6 To continue to update its survey of R&D activities being carried out by member utilities in accordance with its Terms of Reference.

5.7 STATUS OF CURRENT AND COMPLETED RESEARCH & DEVELOPMENT ACTIVITIES IN THE MARITIME ELECTRIC UTILITIES

5.7.1 NEW BRUNSICK POWER

5.7.1.1 Dalhousie Unit No. 1 - Orinoco Fuel Project

Objective: Venezuela has extensive reserves of an extra heavy hydrocarbon known as Orinoco which has potential as a thermal plant fuel. The objective of this project is to develop and optimize the technology for the handling, storage and burning of this fuel in a commercial-sized unit such as Dalhousie Unit No. 1.

Description: NB Power has entered into an agreement with Lagoven, S.A., an operating subsidiary of Petroleos de Venezuela, S.A., the national oil company, to conduct a test burning of Orinoco fuel to be supplied by Lagoven, S.A. Modifications will be made to the Dalhousie Unit No. 1 to accommodate the handling and burning of this special fuel, with funding provided by the Venezuelan company.

Since this fuel is about one-third higher in sulphur content in comparison to existing fuel oil normally used at Dalhousie No. 1, limestone injection will be required at the burner tip in an effort to reduce emissions.

This project could, if successful, result in this heavy fuel becoming a potential economic alternative fuel for NB Power existing oil-fuel units.

Status: Design and ordering of equipment for modifications to Dalhousie Unit No. 1 to enable handling, storage and burning of Orinoco fuel began in 1986. The test will begin in mid 1987 with the project completion scheduled for March 1988.

Cost: $13.4 million

Funding: Lagoven, S.A.

Contact: C.T. Flynn, NB Power
506-458-4259

5.7.1.2 Circulating Fluidized Bed Demonstration Project

Objective: To demonstrate this technology on a utility system utilizing locally-available fossil fuels. The initial test period, which utilizes Maritime fuels and sorbents, is scheduled to be completed by March 1988. Following this, the facility will be available to perform tests on other fuels and sorbents. It is anticipated that the facility will attract interest from other Canadian and international parties, from which further test programs will develop.

Description: This project includes the construction of a new circulating fluidized bed at NB Power's Chatham generating station which will be integrated with the existing 22 MW unit 2 turbine/generator. Following construction, the unit will be used to demonstrate the co-combustion of New Brunswick high-sulphur coal and low-grade oil shales with locally-available limestone. The technology promises at least 90% sulfur capture during the combustion process, thus enabling compliance with the federal government's new source performance guidelines.

Status: The CFB project construction was essentially completed in 1986 and initial commissioning began in the fall of 1986. The R & D test program will begin in 1987 and will run until March 31, 1988.

Cost: $33,000,000

Funding: Energy Mines and Resources Canada

Contact: C.T. Flynn, NB Power
506-458-4259

5.7.1.3 Distributed-Mixing Coal Burner Development

Objective: To demonstrate this technology on a 1 MMBTU/hr test rig with New Brunswick and Nova Scotia coals, limestone and oil shales.

Description: Distributed-mixing combustion of solid fuels has been developed in the U.S. and elsewhere as a means of retrofitting existing coal-fired boilers to reduce emissions of nitrogen oxides by as much as 50%. A series of test burns were conducted using Minto and Devco fuel with Havelock limestone. A feasibility burn of coal and oil shale was completed.

Status: This phase of the project was completed in August 1986. The final report is being written.

Proposals have been submitted to EM&R for funding for a two year operation to conduct more detailed studies of coal/limestone burning and coal/oil shale burning as well as using an alternative sorbent with a different sorbent injection location.

Cost: $800,000

Funding: Energy, Mines & Resources Canada

Contact: C.T. Flynn, NB Power
506-458-4259

5.7.1.4 OX-CE Fuel Demonstration at the Chatham Generating Station

Object: To evaluate the performance of coal-water fuel burners that have been installed in boilers 1 & 2 at the Chatham Plant using the commercially-available OX-CE fuel and comparing the results with those obtained earlier while using a coal-water fuel supplied by the Cape Breton Development Corporation (CBDC).

Description: This was a joint project of Energy, Mines and Resources Canada and NB Power.

The OX-CE Fuel Company whose coal-water fuel processing plant is located in Jacksonville, Florida agreed to provide 510 tons of fuel for the test free, with the project accountable for absorbing the transportation of the fuel.

Some fuel instability problems were experienced. The fuel was successfully rehabilitated at the Chatham Plant to the point where it could be burned very successfully.

Status: The project was completed and the final report was issued in May 1986.

Cost: The project budget was $200,000.

Funding: 100% funded by Energy, Mines and Resources Canada.

Contact: D. M. Rankin, NB Power
506-458-4275

5.7.1.5 NRC Demonstration at the Chatham Generating Station

Objective: To prove NRC coal-water fuel atomizers on Chatham No. 1 boiler at the 40 million BTU/HR level.

To demonstrate the performance of a fabric filter when burning coal-water fuel.

Description: This was a joint project of Energy, Mines and Resources Canada and NB Power. Results showed that the NRC-designed atomizer provides good atomization and stable flames. The project was expanded to include the demonstration of the use of a fabric filter (bag house) on the flue gases.

Status: NRC has scaled up their burner/atomizer and a test was conducted in early 1986 in conjunction with a bag house demonstration on Chatham Unit No. 1.

The work has been completed and the final report issued July 1986.

Cost: The project budget was $495,000.

Funding: 100% funded by Energy, Mines and Resources Canada.

Contact: D. M. Rankin, NB Power
506-458-4275

5.7.1.6 Coal Wash Project

Objective: The object of this project is firstly, to provide an order-of-magnitude cost of constructing a coal wash plant and its impact on the cost of operation; and secondly, to carry out a pilot test of washing Minto coal at EMR's Devon Research Facilities; and to assess the effect of washing on combustion.

Description: This project was undertaken by NB Power with laboratory support from EMR Canada. A study on the economics of constructing coal washing facilities and the assessing of operating costs was carried out by NB Power.

A 70 ton sample of Minto coal was provided by NB Power from the No. 8200 seam and sent to EMR's Devon Research Facilities where the coal was washed and assessed at various levels of thermal recovery. Washed samples were then transported to EMR's Combustion Laboratory at Bell's Corner, Ottawa for combustion tests along with a sample of unwashed coal.

Status: The combustion tests have been conducted and results have been assessed by EMR scientists. The report has been completed.

Funding: $50,000 NB Power and Laboratory Test EMR Canada.

Contact D. M. Rankin, NB Power
506-458-4275

5.7.1.7 Development of an On-Line Performance Monitoring System

Objective: To develop a real-time unit performance monitoring system on a coal-fired generating unit to provide information on plant efficiency and diagnostic capabilities.

Description: The system is a microprocessor-based data collection and analysis unit which accesses the plant operating data and provides feedback to operations on operating problems and the impact of design conditions. Analyses of certain areas of the cycle are provided to aid operator actions.

Status: Initiated January 1985, project on-going to demonstrate long-term reliability.

Current termination June 1987. An extension has been suggested and may proceed subject to the agreement of EM&R, CAT and NB Power.

Funding: Joint Venture Project with EM&R, Canadian Applied Technology (CAT) and NB Power

Contact: R. Pickles, NB Power
506-458-3049

5.7.1.8 Retrofit Variable-Speed Drive to an ID Fan

Objective: To retrofit and evaluate the addition of a 600-volt drive system to a 4160-volt application.

Description: The existing induced-draft fan at the Chatham Coal/Oil Shale Demonstration project is powered at 4160 volts. This project will provide an alternate feed to that motor through a standard 600 volt variable speed drive using input and output transformers. The study aspects of the project will concentrate on harmonic effects and efficiency.

Status: Work is progressing on the purchase and installation of the equipment with testing to take place in early 1988.

Cost: $175,000

Funding: 100% CEA

Contact: A. Gunn, NB Power
506-458-4230

5.7.1.9 Electrical Testing of Thermally-Deteriorated Converter Transformer to Determine Remaining Electrical Strength

Objective: To evaluate the reduction in power transformer life as a result of continuous long-time overloading.

Description: Since 1983, NB Power has been involved in a change-out program of the converter transformers at the Eel River HVDC station following the failure of one unit. During repair following the fault, thermal degradation to both the valve and high-voltage windings was observed; even though the units had been in operation for only twelve years with a continuous overload of 10%.

Electrical testing was carried out by CGE at the Guelph Plant in September 1985. In general, the results were better than anticipated. As a result of these tests, the spare converter transformer was not rebuilt. This was a saving to NB Power of about $400,000. Further testing of paper samples taken from the tested transformer during the rebuilding program is presently being done.

Status: It is anticipated that all testing will be completed during the first quarter of 1987 with the final report completed soon thereafter.

Cost: $30,000

Funding: CEA - first $15,000 / balance by NBP

Contract: M. N. Campbell P.Eng., NB Power
506-458-4220

5.7.1.10 Lightning Ground Flash Density Measurements In Canada

Objective: To conduct lightning ground flash density measurements in Canada.

Description: Many countries in the world have conducted extensive lightning ground flash density measurements and built up data banks to aid in the design of lightning protection. This project will undertake to perform a similar function across Canada using the CIGRE 10 kHz vertical aerial counter. NB Power are participating with CEA by setting up and monitoring the test sites in New Brunswick and providing a member to the Task Force guiding the project.

The results will more accurately define the isokeraunic levels across Canada and provide the basis for design parameters which could result in reduced transmission line costs without any loss in reliability.

Status: Project is behind schedule. Problems with the monitors have been resolved. Monitors to be installed in NB during 1988.

Cost: Total project $350,000 NB Power Share $10,500

Funding: CEA (179 T 382)

Contact: D. E. Clark P.Eng., NB Power
506-458-4085

5.7.1.11 Field Trials Of Galloping-Control Devices For Bundled Conductor Lines

Objective: To record the performance of a selected control device during galloping conditions.

Description: NB Power is a participating utility in this contract that CEA has with Ontario Hydro.

NB Power test site is on Line #3006 (Salisbury, NB to Onslow, NS). The control devices are on three spans on the section of line across the Tantramar Marsh, a location where six towers collapsed during ice storm in 1980, and as yet still unexplained as to the reason for the failure.

The type of control device on this 345 kV, 795 MCM ACSR bundled conductor line is a detuning pendulum. These can be seen from a provincial access road five miles north of the western exit to Sackville from the Trans Canada Highway.

Performance of spans with and without detuning pendulums will be recorded on 3 minute reels of 8 mm movie film. Sackville District personnel were trained by Ontario Hydro and given guidance on when to suspect galloping could occur.

Status: Field tests began in November, 1986. Forecast to be completed end of 1988.

Cost:	Total Project cost	- $130,000
	Installation costs for NB Power portion	- $5,000

Funding: CEA Contract - 133T386
Contractor - Ontario Hydro
NB Power contributed the installation costs.

Contact: R.E. Haggerty, P. Eng, NB Power
506-458-4302

5.7.1.12 Power System Harmonics - A Review and Assessment of Problems

Objective: The purpose of this study is to recommend a course of action for CEA to follow to assist utilities to come to terms with the power system harmonics issue.

Description: A considerable amount of research work has been done by CEA and other groups to investigate problems associated with Power System Harmonics. Most Canadian utilities enforce a general requirement that their customers not operate harmonic-frequency generating equipment which adversely affects other utility customers. However, the acceptable limits and standards are not well defined. Detection and measurement of disturbing harmonics is also difficult with the onus, in most cases, left with the affected customer to identify the problem and register a complaint.

The project reviewed the existing work done and analyzed the need for further work from the viewpoint of customer utilization and the effects of disturbance both on the customer and the utility. Specific questions to be answered included:

- What are major customer utilization concerns and effects of disturbing harmonics?
- What amount of customer complaints and damage is resulting?
- Is there a need for utility standards stating acceptable levels of power system harmonics?
- How can the concerns and requirements best be met?

This Canadian Electrical Association Project was awarded to the University of New Brunswick.

Status: 100% completed. Final report issued in March, 1986.

Cost: $47,541

Funding: 100% Canadian Electrical Association, R&D Division (CEA 415U474)

Contacts: R. Little, NB Power
506-458-4293

5.7.1.13 Survey of Canadian Electrical Inspection Authorities Re: Service Entrance Upgrading Practices

Objective: To survey all the Canadian Electrical Inspection authorities to obtain their opinions and ruling on the acceptability of the proposed modification techniques of CEA Project 334USOA - Upgrading Residential Service Entrance

Description: CEA Project 334USOA outlined several economical upgrading methods which could be used to effectively permit an increased load on existing electrical entrance panels. Traditional methods of upgrading normally meant replacing everything, which was a very costly proposition.

This Canadian Electrical Association project was awarded to Neill and Gunter of Fredericton, NB.

Status: 100% completed. Final report issued June 1986.

Cost: $10,500

Funding: 100% Canadian Electrical Association, R&D Division (CEA 444UATS)

Contacts: R. Little, NB Power
506-458-4293

5.7.1.14 High-Temperature Industrial Heat Pump Laboratory

Objective: To conduct a feasibility study on the economics, effectiveness and application of such a facility in Canada.

Description: This Canadian Electrical Association (CEA) study was conducted over a three-month period and considered the following:

a) feasibility and effectiveness of the laboratory
b) clients and usage of laboratory and its results
c) funding requirements for the laboratory
d) expected funding sources for the laboratory
e) expected benefits/costs of such a laboratory

This contract was awarded in January of 1986 to Neill and Gunter Consultants of Fredericton, NB.

Status: 100% completed, final report issued July, 1986.

Cost: $19,950

Funding: 100% CEA R & D Division (CEA 525U536)

Contact: R. Little, NB Power
506-458-4293

5.7.1.16 Heat Pump Dehumidification Drying in a Fish Smokehouse

Objective: The purpose of this study is to carry out an economic and technical comparison of a dehumidification heat pump with the new propane smoking method as well as the traditional method.

Description: The drying and preservation of fish by smoking has been the traditional method for many years. The system is effective, but slow and permits variations in the final product quality.

Newer techniques are being tried such as forced air circulation, injection of smoke from an exterior source and auxiliary heat requirements being provided by propane heaters.

This project will install and operate a dehumidification heat pump in a section of the smokehouse which will permit direct economic and technical comparisons with the other two methods.

Status: This Canadian Electrical Association study will be carried out by NB Power and Energy, Mines & Resources utilizing an existing smokehouse located in Cap Pele, New Brunswick.

The project has received a 4-6 month set-back due to fire in the host building. Rebuilding is currently underway and the project will recommence in early summer. The project duration is 12 months.

Cost: CEA: $35,000
EMR: $15,000

Funding: Canadian Electrical Association $35,000.
Energy, Mines & Resources $15,000
CEA Project # 608U556

Contact: R. Little, NB Power
(506) 458-4293

5.7.1.17 Scheduling of Major Thermal Power Plant Equipment Inspections

Objective: Review practices employed in the utility industry for the scheduling of major plant overhauls (eg. turbine generators) to provide economic benefits, reduce down-time and optimize overhaul practices.

Description: This state-of-the-art project is a joint effort between the Energy Conversion Group of the University of New Brunswick and NB Power. UNB will conduct the literature search, with NB Power providing technical assistance.

Status: Project started in July 1986. Completion scheduled for March 1987.

Funding: CEA (610G562) $25,000.

Contact: J. Sturgeon, NB Power
(506) 458-4481

5.7.2 NOVA SCOTIA POWER CORPORATION

5.7.2.1 Accelerated Material Evaluation of Polymer Insulators for Transmission Lines

Objective: To evaluate the effect of pollution on polymer insulators in a salt fog environment.

Description: NSPC is participating in this CEA R&D Project undertaken by IREQ (Hydro-Quebec). Six polymer insulators of three makes, Ohio Brass Hi-Lite, Ceraver Armourlite and Rosenthal Roderflex were installed hot by NSPC on L-7011 in the Lingan area in November 1982. One unit of each make was equipped with a corona ring.

Status: All observations and data collection were completed in 1986. A final report is expected before end of 1987.

Cost $229,230

Funding: Canadian Electrical Association (R&D Project No. 121-T-226).

Contact: W. Chappell, (NSPC)
902-876-7801

5.7.2.2 Application of Ion Chromatography To Chemical Analysis of the Steam/Water Cycle (CEA Project 535 G 535 awarded to N.S. Power Corp).

Description: The importance of high-purity feedwater for maintaining the integrity of components of high-pressure steam plant has long been recognized. Present standards in terms of 1 ppb are amenable to instrumentation such as sodium ion analyzers and cation conductivity. These

are effective only with specialist support staff on hand. The ion chromatograph overcomes the analytical problems in measuring low levels of sulphate and chloride. On-line instrumentation has been developed and is currently under evaluation. This project will seek to adapt a low-cost ion chromatograph for on-line use in high pressure thermal plant analytical systems.

Status: Initiated September 1985, scheduled completion December 1986. Draft final report issued, awaiting monitors' comments before final issue. The project has had encouraging results, and is being retrofitted to two (2) NSPC units.

Funding:	CEA R&D	$40,000
	Co-Funding	$40,000
	Total	$80,000

Contact: A.J. Farmer, (NSPC) Project Leader.
902-428-6869

5.7.2.3 Atmospheric Fluidized Bed Studies

Objective: To build an atmospheric fluidized bed combustor and to conduct a 10,000-hour test program which is intended to investigate the corrosion/erosion characteristics of in-bed and convection-pass tube materials.

Description: NSPC is managing the project which includes the design, construction, commissioning and operation of the test rig with a bed size of 1 m x 1 m. The in-bed and convection pass tubes are either water-cooled, air-cooled or uncooled. The rig generates no steam. Combustion Engineering Canada Limited was involved in the construction of the rig proper, while NSPC is responsible for the balance of the project.

Status: The project was completed as of 1986 03 30.

Cost: Final cost is projected to be slightly less than $8 million for all aspects of the program.

Funding: Energy, Mines and Resources Canada.

Contact: N.W. Andrews, (NSPC).
902-428-6367

5.7.2.4 Circulating Fluidized Bed (CFB) Feasibility Study

Objective: To study the feasibility of circulating fluidized bed boilers for Utility application in the 150 MWe size range. Specifically, instrumentation and control systems will be investigated to prove safe start-up, load-following, and flexibility capabilities of the system. Additionally, studies on feedstock preparation and injection, dust collection, and waste disposal will be conducted.

Description: NSPC is managing the study under the general guidance of the CFB Management Board. An assessment of the capabilities of various manufacturers to build CFB's sized at 150 MWe will be examined.

Status: Draft report dated 1986 01 31 has been completed. An expanded terms of reference was approved on 1986 10 22 to address related CFB technical issues.

Cost: $500,000 has been appropriated for salaries and expenses associated with the study.

Funding: Financial support will be provided through the offices of the Oil Substitution Committee.

Contact: N.W. Andrews, (NSPC).
902-428-6367

5.7.2.5 Coal-Liquid Mixtures Conversion Feasibility Study

Description: As part of the Federally-funded ($8.8 million) coal-water fuel demonstration program currently underway and centered on a combustion demonstration on the No. 10 Unit of Maritime Electric's Charlottetown, PEI Generating Station, NSPC undertook a paper study to evaluate the technical and economic problems/benefits of converting the 100 MW - No. 2 Unit at Tuft's Cove to coal-water fuel. Fenco-Shawinigan were commissioned to perform the study.

Status: Final report of the phase I study was received in May 1986. Due to the unattractive economics of Coal-Water fuels vs fuel oil, the phase II study (detailed analysis/work definition/cost estimates/etc.) was postponed indefinitely.

Contact: A.J. Neale, (NSPC).
902-428-6903

5.7.2.6 Control of Distribution Line Galloping (CEA Project No. 196 D 367, awarded to Ontario Hydro).

Objective: To obtain reliable observations of performance of promising control devices during galloping occurrences.

Description: NSPC are co-operating in this project. Two galloping-control devices, the air-flow spoiler and the detuning pendulum have been installed on a six-span section of line in the Cheticamp area. Eighteen air-flow spoilers, three per span, and six detuning pendulums, one per span, were installed on different phases. The remaining phase with no devices installed will be used as a reference. Interphase spacers were installed on four other spans along the same section of line making a total of 10 spans in the test.

These tests will determine the overall effectiveness of the control devices under natural galloping conditions, and provide recommendations on the application of these devices to eliminate or reduce the effects of galloping on existing and new distribution lines.

Status: A galloping occurrence was observed on 1986 01 22. A film of the occurrence was taken and sent to Ontario Hydro Research for analysis. One of the interphase spacers has failed. The failed unit was sent to Ontario Hydro Research. The project has been extended to the end of 1987 when a final report is expected.

Funding: Material and monitoring equipment provided by Ontario Hydro under CEA contract. Control devices installed and monitored by NSPC.

Contact: K.S. Mathur, (NSPC).
902-876-7801

5.7.2.7 Evaluation of CCA-PEG Treated Scotch Pine Poles

Objective: To determine the acceptability of treatment from environmental and climbability points of view.

Description: 100 CCA-PEG treated Scotch Pine poles were installed in the Clare District. The poles were initially inspected in accordance with CSA Standards 015.3 and 080 for physical defects and preservative penetration and retention requirements. Hardness measurements were taken using a pilodyn penetrometer and the Linemen's climbability perception was recorded.

Water and soil samples were taken in the area around the poles to determine leachability of the preservative.

The results of these tests will be used to determine if this type of preservative treatment is environmentally acceptable and helps the climbability of the pole.

Status: Commenced in 1986, poles were tested initially in the Spring and for climbability, soil and water samples in mid Summer. Poles will be tested and monitored through 1987-88.

Funding: NSPC in-house project.

Contact: K.S. Mathur, (NSPC)
902-876-7801

5.7.2.8 Field Testing of Distribution Equipment and Line Materials in a Marine Atmosphere

Objective: To evaluate corrosion of equipment in a marine atmosphere.

Description: A 25 kV line along Inverness Beach feeding summer cottages has been fitted with various components such as cutouts, lightning arrestors, epoxy arms, insulators, connectors, clamps, etc., to study the effect of salt contamination under normal operating conditions. This experience will assist in the evaluation and selection of suitable materials for construction of distribution lines in sea coast areas.

Thirty-three powder-coated distribution transformers have been purchased with a polyester finish. They are being installed in salt and industrial-polluted areas in Eastern and Western Zones. Three additional powder-coated transformers were installed in the Peggy's Cove - Prospect area as part of CEA R&D Project 78-94 awarded to BC Hydro.

Status: Powder-coated transformers were inspected, and evidence of rust was found on all transformers. The rust signs are quite evident at the bottom of the transformer tanks and near the transformer hanger brackets.

We have concluded that this type of paint does not provide adequate protection against corrosion due to salt contamination in our sea coast areas.

We are still evaluating material installed at Inverness Beach.

Funding: NSPC in-house project.

Contact: K.S. Mathur, (NSPC).
902-876-7801

5.7.2.9 Field Testing of Insulators and Associated Equipment on 25 kV Distribution Lines in Coastal Salt Environment (CEA Project No. 081-D-557 Awarded to NSPC)

Objective: To evaluate the effectiveness of CSR (Controlled Surface Resistance) insulators, cutouts, arresters, and transformer bushings as well as stainless steel transformer tanks, various synthetic suspension insulators, and connectors.

Description: Purchase and install controlled surface resistance (CSR) glazed insulators, cutouts and arresters, synthetic deadend insulators, stainless steel transformers and various connectors. The equipment will be installed on a section of existing 25 kV line near Centreville, Digby County, N.S.

Performance of these insulators and equipment will be monitored and compared with the previous outage statistics of this line to determine the effectiveness of this equipment in salt-contaminated atmosphere.

The results will provide power utilities with much needed technical information to design and operate distribution lines in coastal areas with minimum interruptions due to salt contamination.

Status: Commenced in 1986, material has been received and will be installed early 1987.

Funding: Material purchase and installation CEA funded. NSPC monitoring performance of equipment.

Contact: K.S. Mathur, (NSPC)
902-876-7801

5.7.2.10 Marginal Cost-Based Peak Load Pricing and Load Control Study

Objective: To investigate the applicability of marginal cost pricing, time of use pricing, modeling techniques for load and sales forecasting, load management and load research to a utility and to determine how these systems can lead to more efficient utilization of the utility's energy resources.

Description: The study comprises the following modules:

- Cost of Service study
- Marginal Cost Study
- Load Research Study
- Rate and Load Management Experiments
- Load and Sales Forecasting Study
- Overall Cost Benefit Study

Status: Studies of Cost of Service, Marginal Cost and Load and Sales Forecasting are complete and final reports have been issued. A load research system is in operation with 800 data collection points comprising all customer classes distributed throughout Nova Scotia. A Load Management experiment comprising of 50 domestic water heaters was completed in 1986 and results are being analyzed. Final reports on the remaining modules will be issued in 1987.

Cost: $3,225,000 for equipment and external consulting. (NSPC manhours are not included in cost.)

Funding: Total of $3,225,000 funded 80% by Federal government and 20% by Province of Nova Scotia. Additional funding of $175,000 by the Oil Substitution and Conservation Agreement (EM&R) has been obtained to complete the project.

Contact: Jack Kiuru, (NSPC).
902-428-6172

5.7.2.11 Nova Scotia Add-On Plenum Heater Experiment

Objective: To test the application and effectiveness of dual-fuel systems, particularly oil and electric. This will evaluate the capability of dual fueled heating to reduce oil consumption while improving the utilization of coal-fired generation and to reduce future peak loads.

Description: The add-on plenum electric heater installed in the supply duct or plenum of oil-fired hot air furnaces of 150 domestic residences allows these objectives to be met while providing additional information on their cost effectiveness, convenience and acceptability to customers in Nova Scotia. An additional 100 domestic customers will have their furnace oil consumption monitored and serve as a control group to the basic study. The dual fuel concept will be expanded to include hot water and heat pump systems for approximately 15 commercial/institutional customers for the second phase of the experiment.

Status: The project was initiated in January of 1986 and is expected to be completed in August of 1988. Approximately half of the domestic heaters and their associated control sites have been installed as of December 31, 1986.

Funding: Funding of $1,025,000 was provided by the Oil Substitution and Conservation Agreement.

Contact: Jim Kirby, (NSPC).
902-428-6664

5.7.2.12 Performance of Preservative-Treated White and Red Spruce Poles: Examination for Checking Toughness (CEA R&D Project 77-29A, awarded to Forinteck)

Description: Approximately 144 ACA-treated spruce poles have been installed in the Guysborough Area (Dickie Brook line). These poles were cut in 1977-78 from Hants County, Nova Scotia. Incisions were made along the full length of the poles and full-cell treatment of ACA product was applied in accordance with CSA Standard 0-80. The penetration depth averaged to 1.10 inches.

Examination of the poles carried out in 1981 shoved incised poles as moderately checking and non-incised poles as severely checking. Hardware removed from some poles in 1984 shoved signs of corrosion.

A common complaint from the linemen was the hardness of the poles and vertical splits making them difficult to climb.

Status: A report was prepared by Forinteck for the 1984 examination done on the poles.

The report recommended another examination be done in 4-5 years as part of continuing their long term performance evaluation. NSPC will continue to monitor performance.

Funding: Poles and installation funded by NSPC. Inspection and report funded by CEA R&D.

Contact: K.S. Mathur, (NSPC).
902-876-7801

5.7.3 MARITIME ELECTRIC COMPANY, LIMITED

5.7.3.1 Wind Test Site - North Cape, P.E.I.

Description: This is a national facility available to Government and private industry for field testing of windmills. Laboratory facilities provide data acquisition for the determination of unit performance.

Status: Operation continues. Two new units were installed in 1986 with plans for further units in 1987.

Funding: Site is operated by Resource Ventures Ltd. under long-term contract from the P.E.I. government with an annual operating grant from N.R.C.

MECL Involvement - MECL has agreed to purchase output on an "energy displacement" basis. MECL also provides technical assistance on an 'as required' basis.

Contact: J.A. Lea (MECL)
(902) 566-1599

5.7.3.2 Coal-Liquid Mixture Combustion - Charlottetown, P.E.I.

Objective: To determine the practicality of burning coal-water mixtures as a direct replacement for heavy fuel oil.

Description: This project is designed to investigate the practicality and effectiveness of burning a Carbogel (coal-water) mixture in a utility boiler originally designed to burn oil. The project will also demonstrate the feasibility of production and delivery of Carbogel in sufficient quantities for combustion. Further information to be gained from the project includes:

- transportation, storage and handling of Carbogel
- modification to oil-fired boilers
- design of coal-water burners
- combustion efficiency
- economic data

Status: Project 75% complete. Scheduled for completion in mid 1987.

Cost: $8.8 million

Funding: Energy, Mines & Resources Canada

Contact: J. L. Boomhover, MECL
(902) 566-1599

5.7.3.3 Farm Losses Resulting From Electric Service Interruptions

Objective: To obtain an evaluation of the direct and short-term costs incurred on farms as a result of local random supply interruptions.

Description: This project (CEA Project 309 U 403) is being carried out by the University of Saskatchewan and involves the selection of a representative sample of farmers across PEI, and forwarding a questionnaire to them.

Electrical consumption and cost for farms was also forwarded after approval was received.

Cost: $5,000.

Funding: Maritime Electric Company, Limited

Status: Funding has been depleted. Completion of the report is awaiting decision on further funding.

Contact: K. M. Montgomery
(902) 566-1599

5.7.3.4 Transmission Conductor Galloping

Objectives: To determine the performance of alternate methods of controlling transmission line galloping.

Description: Two galloping-control devices, air-flow spoilers and detuning pendulums have been installed on selected spans of a 138 kV transmission line that have experienced galloping. Tests and observations will compare performance of each product with the performance of the spans prior to installation.

Status: Project completed in December 1986.

Funding: Total cost - $15,000

Preformed spoilers provided by Preformed Line Products, Limited. All other costs funded by Maritime Electric Company, Limited.

Contacts: J. Gaudet (MECL)
902-566-1599

5.8 SUMMARY OF CURRENT CEA R&D PROJECTS WITH UTILITY STAFF INVOLVEMENT

5.8.1 NEW BRUNSWICK POWER

NUMBER	TITLE	FUNDING	TECHNICAL ADVISOR
143G299C	Modelling of Long-Range Transport & Acid Deposition - Lagrangian Model	$ 506,100	L. Burns 506-458-3022
104G300	Flame Scanners for Coal-Fire Monitoring	$ 750,000	L. Griesbach 506-458-3291
198G303B	Commercial PMAT for Boiler Tube Inspection	$ 195,000	W. Perrin 506-458-3289
190G363	Brushgear Diagnostic Testing	$ 197,000	D. Tran 506-458-3014
303G371C	Particulate Emissions from High Ashphaltene Fuel Flames	$ 950,000	R. Pickles 506-458-3049
320G396	Calibration of Dye Dilution - Technique for Flow Measurement	$ 49,000	F.W. Davies 506-458-3109
302G401	Optimization of Welding Procedures for Hydraulic Turbines	$ 150,000	F. Harriman 506-458-3093
218G408C	Boiler Tube Erosion Evaluation	$ 292,600	B. Kennedy 506-684-3387
419G485	Robotic System for the In-Situ Repair of Hydraulic Turbine Runners	$ 500,000	F. Harriman 506-363-3093
423G494	CFBC Waste Characteristics, Environmental Impact, Disposal Recommendations & Utilization Potential	$ 189,000	C. Doiron 506-458-3021
535G535	Application of Ion Chromatography to Chemical Control of Steam/Water Cycle	$ 80,000	C. MacNeil 506-635-8225

NUMBER	TITLE	FUNDING	TECHNICAL ADVISOR
520G544	Research on Acoustic Vibration of Piping Systems	$ 283,000	A. Nabuurs 506-458-3045
186T350	Brittle Fracture of Non-Ceramic Insulators	$ 196,900	M. Campbell(c) 506-458-4220
179T382	Lightning Ground Flash Density Measurements in Canada	$ 303,710	D. Clark 506-458-4085
200T387	Powerline Carrier Radio Frequency to and from Radio Communication Services - Phase I	$ 200,000	Y. Picot 506-458-3162
202T444	Resistance to Oxidation of Reclaimed Transformer Oils	$ 95,767	M. Campbell 506-458-4220
243T484	Instrumentation for Grounding Measurements	$ 62,308	A. Gilliss 506-458-4279
260T507	Gas-In-Oil Analysis	$ 110,000	M. Campbell 506-458-4220
413U459	Applications of Water Heating	$ 80,000	R. Gulliver 506-458-4279
409U464	Potential for Electrical Drying Processes in Canadian Industry	$ 127,000	R. Little 506-458-4293
525U536	Development of a High Temperature Industrial Heat Pump Laboratory	$ 20,000	R. Little 506-458-4293
608U556	Heat Pump Dehumidification Drying in a Fish Smokehouse	$ 50,000	R. Little 506-458-4293

Work Groups, Task Forces and Advisory Panels

WG140	HVDC Working Group	Chairman	T.H. Lee 506-458-3245
		Liaison Member	R.E. Haggerty 506-458-4302

-	Advisory Panel on Flue Gas Emission Control		G. Gunter 506 458-4381
335U	Commercial Industrial Applications Task Force	Chairman	R. Little 506-458-4293

5.8.2 **NOVA SCOTIA POWER CORPORATION**

NUMBER	TITLE	FUNDING	TECHNICAL ADVISOR
004G213	Electrical Parameters of Large Turbo-Generators	$ 230,000	R.W. Brown
112G277	Internal Treatments of Desuperheaters to Prevent Exfoliation	$ 100,000	P.F. Stout (c)
431G294	Investigation of Dry Deposition Fluxes	$ 617,000 $ 335,000 (C.F.)	O.J. Betancourt
104G300	Flame Scanners for Coal Fire Monitoring	$ 550,000 $ 200,000 (C.F.)	P.F. Stout (c)
303G371	Particulate Emissions from High Asphaltene Fuel Flames	$ 210,000 $1,200,000 (C.F.)	I.D. Covill
318G394	Acid Deposition and Forest Damage in Canada	$ 135,000 $ 119,000 (C.F.)	O.J. Betancourt
322G395	Hydrogeological Considerations for Fly Ash Fills	$ 85,000 $ 50,000 (C.F.)	T. Kumanan
218G408	Boiler Tube Erosion Evalution	$ 292,600	I.D. Covill
309G409	Rockwell Combustor Program	$ 560,000 $ 140,000 (C.F.)	D.K. Blamire (c)
327G431	Assessment of Air Flow Measurement Techniques	$ 50,000	A.J. Farmer
341G469	Study of Middle Distillate Fuel Stability	$ 100,000	I.D. Covill (c)
423G494	CFBC Waste Characteristics, Impact, Disposal, and Utilization	$ 164,000	D.K. Blamire (c)
516G515	Coal Combustion Research	$ 300,000 $3,300,000 (C.F.)	I.D. Covill
439G520	Analytical Test Methods for Organic Contaminants in Steam/Water Cycles	$ 107,000	P. Whitehouse

NUMBER	TITLE	FUNDING	TECHNICAL ADVISOR
535G535	Application of Ion Chromatography to to Chemical Control	$ 40,000 $ 40,000 (C.F.)	A.J. Farmer (see note 1)
513G543	Field Evaluation of Fish Behavioral Devices	$ 123,000(C.F.) $ 105,000 (C.F.)	T.P. Toner
532G546	Upper Furnace Dry Sorbent Injection	$ 410,000 $1,900,000 (C.F.)	D.K. Blamire
634G568	Steam Turbine Blading Repairs	$ 300,000	W.C. Harris (e)
601G569	Review of Environmental Monitoring Equipment	$ 120,000	G.J. Lajeuness (e)
604G560	Review of Fish Habitats and Spawning in Hydro Developments	$ 80,000	T.P. Toner (e)
023T217	Simulation of Reradiation of Broadcast Signals by Power Lines	$ 115,131	H.F. McMullon
207T483	Transmission Line and Station VHF Noise	$ 286,949 $ 600 (C.F.)	H.F. McMullon
175T331	EMTP Development Coordination Group	$1,036,000 $5,964,000 (C.F.)	D.J. Mader
ST137	Position Paper on Lightning Performance of Transmission Lines Without Overhead Groundwires	$ 5,000	D.J. Mader (Author)
042T178	Development of an Arc Furnace Model	$ 60,000	R.W. Creighton
516UCON	NBEPC/CEA Heat Pump Conference	$ 1,000 $ 3,000 (C.F.)	D. Barteaux
608U556	Heat Pump Dehumidification Drying in a Fish Smokehouse	$ 35,000	J. Fraser
417U475	Development of Electric Element Arrays Operating at High Voltage	$ 120,000 $ 133,200 (C.F.)	J. Fraser (e)
639UCON	CEA/EPRI Conference on Marketing Electrotechnologies to Industry	$ 5,000 $ 5,000 (C.F.)	D. Barteaux
507U526	Development of a National Sampling Plan for Canadian Utilities Revenue Meters	$ 25,000	B. Armstrong

NOTE 1: The R&D work for projet 535G535 is being undertaken by NSPC with laboratory and field work supervised by P. Whitehouse and A.J. Farmer as a Project Manager.

NUMBER	TITLE	FUNDING	TECHNICAL ADVISOR
538U558	Old Residential Circuit Breaker Tripping Characteristics	$ 50,300	F. Coolen (e)
647U588	The Application of Ultraviolet Lamps for Water Treatment or Sterilization	$ 25,000	J. Fraser (e)
536UCPM	Marketing Software	$ -	D. Barteaux (i)
416U465	Utility Policies Toward Customer-Owned Generating Facilities	$ 29,000	S. Pronko (c)
544U555	Opportunities for Utility-Owned Combined Heat and Power Systems	$ 25,000 $ 2,100 (C.F.)	J. Fraser (e)
309U403	Farm Losses Resulting from Electric Service Interruptions	$ 92,000	J. Fraser (i)
78-82	Marginal Cost Pricing and Load Studies	$ 15,000 $3,400,000 CF	J. Kiuru (Project Coordinator)
320U564	Emerging Technologies Impacting on Electrical Needs by the Year 2020	$ 60,000	M. MacAlpine (e)
330U451 (343G451)	Criteria for Conservation Investments in Utility Resource Planning	$ 150,000	J. Fraser
401U463	Energy Storage on the Supply Side or on the Demand Side	$ 25,000	M. Whalen
504UCON	CEA/EPRI Load Management Conference	$ 10,000	A. Dominie & J. Kiuru (Authors) J. Fraser (Session Chairman)
077D184	Application Guideline for Lightning Arresters	$ 370,000 $ 95,000 (C.F.)	D. Laking
109D355	Charge-Operated Fault Arc Diverter for Padmount Transformers	$ 120,000 $ 30,000 (C.F.)	H. Guilderson
125D373	Evaluation of Touch & Step Voltage in Underground Distribution Systems Part 3	$ 72,000 $ 22,000 (C.F.)	L. Joudry
161D456	Application of Probabilistic Methods to Distribution System Design	$ 97,000	E. Vienneau
189D364	Y-Y Connections of 3-Wire Service Entrance by Means of Three Transformers	$ 385,000 $ 276,000 (C.F.)	F. Gallagher

Work Groups, Task Forces and Advisory Panels

	Flue Gas Emissions Control	D.K. Blamire Advisory Panel
	Acid Rain R&D Review	O.J. Betancourt Task Force
430U	5-Year Plan Task Force	J. Fraser Member
521U	Business & Marketing Planning Task Force	J. Fraser Member
700U	Demand-Side Management Task Force	J. Fraser Member
WG223	Working Group on Power System Dynamics	R.W. Creighton Member
SD-4C	Std. Spec. For Deadend Polymer Insulators	D. Laking
SD-118	Utility Poles	K. Mathur

ABBREVIATIONS: C.F. - Co-funding
(c) - Corresponding T.A.
(e) - Evaluation
(i) - Project Interface

5.9

CEA R&D SUBCOMMITTEE MEMBERS

SUBCOMMITTEE	NB POWER	TEL. NO.	NSPC	TEL. NO.
Distribution	W.N. Snowdon	506-458-4378	C.J. Courtney	902-876-7801
Generation	E.R. Pickles	506-458-3049	I.D. Covill	902-428-6625
Transmission	R.E. Haggerty	506-458-4302	R.W. Creighton	902-428-6871
Utilization	R.E. Little	506-458-4293	J.C. Fraser (Chairman)	902-428-6876